# 8.02 Document #1

8.02 ELECTRICITY & MAGNETISM
**ORGANIZATION**
SPRING 2001

M.I.T. Physics Dept.
February, 2001
Hale Bradt

## 8.02 ORGANIZATION

**Lectures:** Prof. Hale Bradt, Room 37-587, Phone 3-7550; email bradt@mit.edu
**Admin:** Prof. George Koster, Room 4-334, Phone 3-4870, email phyjbm@mit.edu
Ms. Alicia Duarte, Undergraduate Physics Office,
Room 4-352, phone 3-4855, email aaduarte@mit.edu

**Prerequisites 8.01 and 18.01 required for 8.02**
The Department of Physics has found that most students who have not completed 8.01 and 18.01 are not able to satisfactorily complete 8.02. The Department therefore mandates that all students taking 8.02 must already have MIT credit for 8.01 (any version) and 18.01 (any version). Persons taking the course without both prerequisites will receive no grade on any of the exams nor credit for the course, unless they successfully petition the Physics Department.

To get the prerequisite waived for 8.02, one *must* fill out a petition and submit it to Mr. Brian Canavan (the head of the Physics Education Office, 4-352). He will approve the petition if *all four* of the following criteria are met.

1. the student earned a grade of *D*, not *F*, in 8.01 (any version) at MIT.
2. the student is not on CAP "Warning".
3. the student would have completed 18.02 (any version) or 18.03 in the Mathematics sequence, before starting on 8.02.
4. the petition has the approval of the student's Freshman Advisor.

If the student does not satisfy these criteria, but believes that the circumstances still justify a waiver (for example because he or she has completed more advanced courses), he or she should state the facts on the petition which will be reviewed by the the 8.01 course administrator, Prof. George Koster.

You may, of course, contact Mr. Canavan (3-4841; bcanavan@mit.edu) or Prof. Koster (3-4870; phyjbm@mit.edu) in person to discuss your particular situation.

**Text**
*Physics Vol. 2*, Halliday, Resnick, Krane, 4rd Edition, Wiley .

This text, "Physics Vol 2", covers E&M and optics. (Optics is not covered in this course.) Do not confuse this text with "Fundamentals of Physics" (somewhat lower level). This year the publisher is providing the Coop with some copies of the "Physics Vol. 2 Extended" as a replacement because of a shortage of the non-extended version, at the same price. The E&M portions of the two texts are identical but the Extended version goes on to include other topics in modern physics. You can use either version for this course.

**Alternative Reading** (in Physics Reading Room 26- 152 or in Reserve Book Room)
Marion and Hornyak, *Physics Part 2*, Saunders
Purcell, *Electricity and Magnetism*, 2nd Ed., McGraw Hill
*Feynman Lectures on Physics, Vol. II*, Addison Wesley
Ohanian, *Physics Vol. II*, W.W. Norton
Young & Freedman, *University Physics Vol 2*, 9th Edit., Addison & Wesley
Fishbane, Gasiorowicz & Thornton, *Physics Vol. 2*, 2nd Edit. Prentice Hall

Each of these books has a somewhat different approach or level. Reading another author's approach to the subject matter can often be a great help with a subtle concept. The Marion and Hornyak book goes into most topics somewhat more deeply than HR & K. The Ohanian text shows modern applications of E & M and also goes into some topics more deeply than HR & K. Purcell and Feynman are both renowned physicists who took a turn at writing a textbook. Their books provide new ways to look at the material. The Purcell book uses a different set of units (cgs) which affects the form of equations in E & M, but not in mechanics.

**Handouts**

Most material to be handed out will be distributed during IAP, in the Handout Room of the Physics Dept., 4-339B. The Handouts to look for, after 19 January, are:

| | |
|---|---|
| Handout Math: | Mathematics Supplement for 8.02 |
| Handout #1 | Syllabus and Organization (this document).. |
| Handout #2 | Assignments (problems) and Notes |
| Handout #3 | Solutions to Problems |
| Handout #4 | Old Quiz Problems and Solutions |
| Handout #5 | Lecture Viewgraphs and Demonstration Sketches |

**Special Mathematics Supplement**

This Mathematics Supplement covers 18.02 material that we use in 8.02. It should be read right away (up to triple integrals, p. 19) and you should do the problems, preferably during IAP. In 8.02, we use simple extensions of your 18.01 calculus before they are covered in 18.02. In particular, the double integral (surface integral) is used early in the course. The emphasis in the supplement and the course is that you become comfortable with the *meaning* of the double integral sign (e.g., "the product of a quantity and a differential element of area summed over a 2-dimensional surface"), rather than learning how to carry out complex integrations.

**Lectures**

Lectures are in 26-100 on MWF at 10AM (repeated at 11AM). One lecture is on a Tuesday (Feb. 20)! There is a Review lecture before each Hour Test and two before the Final Exam. There will be one lecture on my research into black holes and neutron stars, on the Friday just before the Spring break.

**Lecture Preview Reading**

A lecture-preview reading assignment is given for each lecture in the Syllabus. It consists of a small portion of the reading that will serve as a quick introduction to the lecture. It is hoped that you will look this over before the lecture in question.

**Hour Tests and Final Exam**

Three 1-hour tests will be given in your **normal lecture hour**. *In 8.02, there will be no "Make-up tests" for low scores.* There will also be a final exam. ***Set aside these dates now.***

| | |
|---|---|
| Test #1 | Friday, Mar 2 |
| Test #2 | Weds., March 21 |
| Test #3 | Fri., April 27 |
| Final Exam | To be scheduled |

Each Hour Test will cover all previous material in the course, but with strong emphasis on the material since the previous Hour Test. It will usually consist of 3 problems *and a brief question based on the demonstrations in lecture, worth about 10% of the credit*. The Final Exam will be a two hour test (3 hours allowed). It will consist of 3-4 problems on material previously covered in the Hour Tests, and 2 or 3 problems on the material covered after Hour Test #3.

**It is important that you take the test *at the time of your scheduled lecture,* and *at the assigned locations*, according to the first letter of your last name . Otherwise severe crowding can occur, and you could be required to move, thus losing time for the test.**

| | | |
|---|---|---|
| **A-K** | **Room 50-340** | **Enter from Memorial Drive side.** |
| **L-Z** | **Room 26-100** | |

**Excuses from Tests.**
***There will be NO make-up tests for missed tests.*** EXCUSES FROM THE HOUR TESTS MUST BE REQUESTED ***IN ADVANCE*** OF THE TEST (if you are physically able to do so) FROM **PROF. GEORGE KOSTER,** IN PERSON OR BY PHONE, Room 4-334, phone 253-4870. (If he does not answer, send email - phyjbm@mit.edu - asking him when you can call or where/when he can reach you.) Acceptable excuses will be rare and will be granted only for verifiable and significant medical reasons. EXCUSES ***NOT*** ACCEPTABLE include doctors' appointments, malfunctioning alarm clocks, the advent of Daylight Saving Time, oversleeping for any reason, travel delays/plans, etc. A grade of zero will be assigned for unexcused missed tests. If you are excused from a test, the remaining tests will be used to determine the overall average test grade. Institute rules govern absences from the Final Exam.

**Recitation and Recitation Quizzes**
The recitations, twice per week, are an opportunity to discuss the material and the problems. You are expected to participate in the recitation activities. There will be a short Quiz in recitation for each Assignment, about once a week (see Syllabus for dates). The other recitations will be designated "discussion recitations". You should be prepared to discuss the specified material in the "Discussion" recitations. Good preparation for these sessions would consist of perusing the material and trying Part (a) of each Problem. *You are expected to prepare for the "Quiz" recitations by doing the assigned Homework Problems.* The homework will *not* be collected, but you should be ready to discuss issues pertaining to it in recitation. Recitation discussions and your preparations for them should run almost contemporaneously with the lectures. Your participation in recitation activities will help you become familiar with the material.

**Changes in Recitation Section**
Until Add Date, there will be no restriction on transfers between sections as long as space is available in the section you desire. Thereafter, changes will generally not be allowed. You must obtain approval for the switch from the Physics Education Office, 4-352.

**Homework Notes, Assignments and Solutions**
A complete set of *Notes & Assignments* for the entire course is being handed out at the beginning of the term together with a full set of *Solutions*. The Notes for a given assignment summarize the important issues or points of possible confusion pertaining to that assignment. *They are not meant to be a substitute for the Textbook.* The problems are generally constructed in a multi-part tutorial format. *You are expected to do the Homework as preparation for the Recitation Quizzes.*

*You should use the Solutions responsibly.* Some of the concepts in E&M are subtle indeed, much more so than in mechanics! Simply reading (and/or copying) the Solutions is the surest way to fool yourself into thinking you understand the material. In fact, they are a poor study tool because they are often quite detailed (in an attempt to be complete), and this can tend to obscure the simple essence if one has not already tried and thought about the problem. *So, put the Solutions out of reach (under your bed or in a friend's room)*, study the Text and Notes, and then spend 30 to 45 minutes on each and every problem (*i.e.*, *suffer a little*), go back through them again, and then consult friends or Solutions as necessary.

*The availability of the Solutions to you gives you rapid feedback on your work. However, it places a special responsibility upon you. It is our opinion that the class of 2004 is up to the challenge. We hope you will find this approach helpful to efficient learning of E & M.*

**Tutorials**
This term, weekly tutorials will be open to all, and they will be required of students who score in the lower ~30% of the class on any given hour test. However, anyone is welcome. Prior to the first test, we encourage any student who feels he or she might benefit from extra help to attend the tutorials voluntarily. We would encourage especially students who earned a C in 8.01 (any version) or who are repeating 8.02 to attend. Each student required to participate (after the first test) will attend one one-hour session each week. He or she will be assigned a tutor based on the first letter of his/her family name. Changing tutors is generally not permitted; see Prof. Koster if you feel your circumstances merit it. Each tutor will always meet in the same tutorial cubicle, near the Physics Education Office (PEO, room 4-352) , *i.e.,* in Room 4-336, 4-338, or 4-344.

The tutors' names, office/phone nos., the alphabetical assignments, the meeting locations, and the several meeting times for each instructor will be made available on the MIT WEB in the 8.02 Course Locker (web.mit.edu/8.02/www/) no later than **5PM on Tues. Feb. 6**. Hard copies will also be posted outside the PEO in Bldg. 4.
*If you wish to participate during the first few weeks, you must submit your first 3 choices of times (in order of preference) to your tutor by email* ***before 11:59 PM on Weds. Feb. 7.*** Your tutor will conduct a mini-lottery to assign meeting times to his/her students and will notify you of your assignment no later than **Friday, Feb. 9 at 5 PM** by return email. Tutorials will meet beginning ***Monday 12 Feb***. After the each quiz the cutoff grade level will be announced and those required to attend will similarly email preferred times to their tutors. Watch the WEB Course Locker for further information on the signup process. As the term proceeds, you may negotiate times with your tutor to suit your convenience.

Participation in the tutorials should substantially improve your understanding and grade in the course. In addition, your tutor will keep track of your participation, and he/she will participate in discussions pertaining to scores that lie at the C/D or D/F boundaries.

**Credit and Grading:** The weighting for the final grade is:

| | |
|---|---|
| Recitation quizzes: | 20% |
| Hour tests @15%: | 45% |
| Final Exam ` | 35% |

The Recitation Quizzes will be graded by your instructor. *A zero will be recorded for missed quizzes, but the lowest quiz grade will be dropped.* Before being weighted into the final grade, the grades from each instructor will undergo a normalization in an attempt to take into account his or her grading practices.

There will be no a-priori boundaries for various final letter grades because we may not anticipate well the difficulty of the tests and final exam. Our view of how much learning corresponds to a certain weighted grade will guide us in setting the boundaries. A grade of "A" will be reserved for truly excellent performance in all aspects of the course, and a "Pass" grade will be earned by those who have clearly exhibited satisfactory (not "marginal") understanding of the material. It is theoretically possible for everyone to earn A’s!

**Honesty on Tests**
It is our strong impression that the MIT student body, almost to a person, adheres to a very high standard of honesty. I have encountered only 2 or 3 cases of 'cheating' on tests in several decades, and these were always by persons who were under severe pressure to succeed, so much so that cheating apparently seemed the best thing to do. If you get behind, you must avoid this illogic; it can only cause you severe grief. No matter how desperate you may be, please remember that failing 8.02 cannot be as bad as the internal and external consequences of dishonesty. In a year or two, you will have put the failed course(s) well behind you, something you cannot easily do with the consequences of dishonesty. We will take any case of cheating on tests that do come to our attention very, **very** seriously. (Think: Committee on Discipline). There are simply no extenuating circumstances for such actions. This pertains to potential

helpers, to helpees, and to those who might be tempted to seek (or pass on) in any way advance information about test content.

**Feedback to the Staff**

You should feel free to make suggestions (written or oral or email, confidential or open) to any of the staff at any time. The web site will have an anonymous message form that shows only the return address you type: If you type “anonymous” instead of your actual email address, it will truly be anonymous. Of course if you want an answer, you must give us your email address. We will solicit course-wide confidential feedback a couple of times during the term. Also, we encourage instructors to request additional confidential opinions from their classes.

END